

**REMARKS**

Applicant affirms the election to prosecute the claims of Group 3 which are Claims 13 – 19 of the above-identified application.

The Examiner has rejected claims 13 – 19 under 35 USC 103(a) over Olszewski, et al, U.S. Pat No. 6,041,621 in view of Cartwright U.S. Pat No. 5,167,126.

At the outset applicant submits that the present invention has two very critical features that are extremely important for a long term reliable operation of a cryogenic refrigeration system. These features are neither taught nor suggested in the prior art. Without these features a cryogenic refrigeration system cannot be utilized in practical applications and will not operate reliably for long time periods, a critical requirement for any field usable system. The first of these key features is the requirement for the use of an oil separator to remove oil from the refrigerant in order to produce a refrigerant stream containing less than 1% by weight lubricating oil. Secondly, the system includes a fixed orifice throttle device to expand the high pressure refrigerant to produce a low pressure low temperature refrigerant stream, the throttle device constructed and arranged to provide during cool down of the refrigerant from normal ambient temperature more than about 60% of the maximum refrigeration capacity of the system available during a desired steady state of operation of the system as shown in figure 2 in the present application.

Furthermore, the system of the present invention is drawn to a closed cycle refrigeration system producing temperatures in the range from about 70° to about 230°K. These are clearly temperatures in the cryogenic range for which the present invention is ideally suited.

Applicant notes the Examiner has clearly admitted that Olszewski et al do not disclose the use of an oil removal technique which is critical to maintaining the ability of the system to produce refrigerant efficiently. Applicant calls the Examiner's attention to the Specification of

the present invention at page 11 lines 4 – 18 where Applicant points out, inter alia, ... “Total elimination of lubricating oil from the refrigerant would be ideal and additional removable/replaceable oil filters can also be employed in accordance with this invention. The lower the lubricating oil content in the high pressure refrigerant stream the better will be the reliability of the system and the better the heat transfer in the evaporator. Excessive oil in the refrigerant stream (greater than 1%) can create a coating on the heat transfer surfaces and reduce efficiency of the heat transfer. Excessive oil can also create a highly viscous oil residue collection in the coldest regions of the system creating an undesired restriction or choke the flow of refrigerant. This can seriously degrade reliability of the system.”

This critical failing of the primary reference is not filled in or completed by the secondary reference to Cartwright. The Cartwright reference is drawn to a refrigerant recovery and recycling operation of a used refrigerant in an air conditioning system for automobiles, not a system used in the cryogenic temperature region of 70° to 230°K. Additionally the Cartwright system employs multiple oil separators without any measurable quantitative criteria of acceptable limits for oil contamination of the refrigerant. The Cartwright system also forms a liquid refrigerant in a condenser and does not concern itself with the formation of a low temperature gaseous refrigerant in the cryogenic region. This is structurally and functionally different than applicant’s system under consideration. Cartwright also provides a metering device in the system, but does not teach or suggest any quantitative values for removal of contaminants from the refrigerant. Applicant’s device or system does not employ liquefaction in a condenser, rather the gaseous refrigerant is cleaned in a filter dryer. Applicant’s system does not employ a metering step.

Clearly the Olszewski et al reference is drawn to a refrigeration system at cryogenic temperatures whereas the Cartwright system is drawn to a refrigeration system for personal

cooling, i.e., the interior of a motor vehicle. The references are disparate and a worker skilled in the art seeking to solve the problems solved by the present invention would not look into the automotive refrigeration art when seeking to solve a problem with a cryogenic refrigeration system. The Olszewski system employs multi-circuit cooling of an industrial gas to form a liquid whereas Applicant uses a single loop circuit to achieve cryogenic temperatures in a refrigerant stream.

Neither the Olszewski or Cartwright systems mention any criteria for the refrigeration capacity that is needed during cool-down from room temperature to make a practical system. The Cartwright system is not used for producing cryogenic temperature refrigeration at all. Contrast this with the Olszewski system which is concerned mainly with the refrigerant design and provides no teaching or suggestion of the refrigeration capacity to be produced. This distinction of defined refrigeration capacity criteria makes Applicant's system unique in cryogenic temperature applications.

The lack of the combination is further reinforced since the Olszewski reference has an effective date of 1998 and the Cartwright reference has an effective date of 1990, clearly a period of eight years within which a worker seeking to solve the problem of a more efficient cryogenic refrigeration system would have made the discovery that Applicant has made and is now claimed.

Applicant furthermore submit that the Examiner has used his own teaching to not only select but to interpret the prior art, a method clearly unsupported by current patent law.

In view of the foregoing, it is respectfully submitted that claims 13-19 in the above-identified application are allowable and the notice to that effect is earnestly solicited.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to

Deposit Account No.50-3841. If proper payment is not enclosed herewith, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-3841. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-3841.

Respectfully submitted,  
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